DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22331-0600

30 SEP 2004

DDESB-IK

MEMORANDUM FOR HEADQUARTERS AIR FORCE SAFETY CENTER
ATTN: SEW

SUBJECT: Reduced Maximum Credible Event (MCE) and Multiple Warhead Hazardous Fragmentation Distance for the AIM-7 with WAU-10 Warheads in the All Up Round (AUR) Container

References: (a) HQ AFSC/SEW Memorandum for DDESB-KT of 23 September 2004, Subject as above

(b) Technical Report MMWRM-TR-84-M25025C, Rev B, August 1985, Ogden Air Logistics Center, Hill, Air Force Base, Utah, Hazard/Quantity-Distance-Test of AIM 7F/M and AIM 9L/M Missiles in All-Up-Round Shipping Containers

(c) DDESB-KT Memo of 5 May 2004, Subject: Approval of Updated Request for Approval of Reduced MCEs for F-15 and F-16 Aircraft with AIM Series Missiles

1. Reference (a) requested Department of Defense Explosives Safety Board (DDESB) approval for:

a. The MCE for multiple AUR containers, each containing four (4) AIM-7 Missiles with WAU-10 Warheads, to be a single AUR container. The supporting basis for this request is reference (b), which documents extensive testing that was conducted with AIM-7 missiles to determine their detonation propagation characteristics in the open as well as within containers. Specific tests evaluated for: 1) Propagation between warheads and between warheads and rocket motors spaced at various separation distances; 2) Propagation between warheads and rocket motors arranged in nose-to-tail and nose-to-nose orientations within simulated AUR containers; and 3) Propagation between simulated AUR containers containing missiles, in order to evaluate vertical and horizontal propagation to other AUR containers.

b. Establishment of a hazardous fragment distance (HFD) of 426 feet for an AUR container of AIM-7 (with WAU-10 Warheads) Missiles. The basis for this request is reference (c), which approved a reduced HFD of 400 feet for an AIM-7 Missile on an aircraft, in the open or in a lightweight structure.

2. Regarding paragraph 1.a. above; Based on our review of the reference (b) test report, we agree that testing was very conclusive in demonstrating that when AIM-7 Missiles (with WAU-10 Warheads) are aligned in the same orientation (i.e., nose-to-nose) that detonation

propagation does occur between the AIM-7 Warheads within the same AUR container, but that there is no contribution from the rocket motor, and that propagation does not occur between AUR containers. Therefore, approval is given for establishment of the MCE, for stacks of multiple AIM-7 Missile (with WAU-10 Warheads) AUR containers, to be a single AUR container. The following pertain to this approval:

a. All four AIM-7 Missiles within the AUR container must be oriented in the same direction. Reference (b) clearly demonstrated that AIM-7 Missile rocket motors do not contribute when packaged in this manner; however, concerns were raised during testing about the rocket motor contribution to the AIM-7 MCE when missiles were oriented nose-to-tail in the AUR container. For this reason, additional testing was recommended to validate the actual MCE contribution of rocket motors. We are not aware of any additional testing that has been done.

b. There are no restrictions on the orientation of AIM-7 Missile (with WAU-10 Warheads) AUR containers, relative to each other.

c. The NEWQD associated with an AUR container is 105 pounds HD 1.1. This is determined by using the MCE of a single AIM-7 (with a WAU-10 Warhead) as 26.1 pounds (from Table 2 of Attachment 1 of reference (c)), and multiplying it by 4, the number of warheads in an AUR container.

d. The QD associated with the AIM-7 (with WAU-10 Warhead) AUR container will be in accordance with paragraph C9.4.1.2.1.1.1 of DoD 6055.9-STD.

3. Regarding paragraph 1.b. above; There is insufficient information provided to support approval of a reduced HFD of 426 feet for an AUR container containing four (4) AIM-7 Missiles with WAU-10 Warheads. Reference (c) HFD were based on missiles installed on aircraft that were in the open or in a lightweight structure. Those HFD address primary fragment hazards as well as breakup of lightweight structures, which were at a significant stand-off from the detonation source and involved a low loading density. Conversely, the AUR container will be in close proximity to the shock loading of detonating munitions (in this case four WAU-10 Warheads), which will result in the generation of many smaller high velocity fragments from the container, as compared to the larger, low velocity debris that can be expected from the lightweight structure analyzed as part of reference (c). The warhead fragments will likely be significantly slowed by the container and should not drive the HFD. It is expected that the debris produced by the AUR container will likely drive the HFD. This needs to be evaluated on its own merit. Once the supporting information has been developed, provide it to this office and we will re-evaluate the request to reduce the HFD for an AUR container containing 4 AIM-7 Missiles with WAU-10 Warheads.

4. DDESB point of contact is Mr. Eric Deschambault. He can be reached at commercial phone: 703-325-1369; DSN: 221-1369; and e-mail: Eric.Deschambault@ddesb.osd.mil.

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